CITY OF OAKLEY (PWS 5160035)
SOURCE WATER ASSESSMENT FINAL REPORT

December 5, 2002

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment area, sensitivity factors associated with the wells, and aquifer characteristics.

This report, *Source Water Assessment for the City of Oakley, Idaho,* describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The City of Oakley drinking water system (PWS 5160035) consists of two ground water well sources and two manifolded spring sources. Both wells are located approximately 1.5 miles south of the city, and the springs are located approximately 5 miles south of the city. Well #1 was constructed in 1970 and Well #2 was constructed in 1991. No information was available as to the Carpenter Springs' construction date, but some significant improvements were scheduled to begin in the fall of 1999. The system serves approximately 730 people through 340 connections (figure 1).

Final susceptibility scores are derived from equally weighing system construction scores, hydrologic sensitivity scores (only in wells, not spring), and potential contaminant/land use scores. Therefore, a low rating in one or two categories coupled with a higher rating in other categories results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with most urban and heavily agricultural areas, the best score a well can get is moderate. Potential Contaminants/Land Uses are divided into four categories, inorganic contaminants (IOCs, e.g. nitrates, arsenic), volatile organic contaminants (VOCs, e.g. petroleum products), synthetic organic contaminants (SOCs, e.g. pesticides), and microbial contaminants (e.g. bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant.

In terms of overall susceptibility, Well #1 rated moderate for IOCs, VOCs, and SOCs, and microbials. Hydrologic sensitivity rated high and system construction rated moderate for the well. Land use scores in the well were low for IOCs, VOCs, SOCs, and microbials (Table 2).

In terms of overall susceptibility, Well #2 rated moderate for IOCs, VOCs, and SOCs, and microbials. Hydrologic sensitivity and system construction rated moderate for the well. Land use scores in the well were low for IOCs, VOCs, SOCs, and microbials (Table 2).

In terms of overall susceptibility, Carpenter Springs rated low for IOCs, VOCs, SOCs, and microbials. The spring rated high for system construction and land use scores were low for IOCs, VOCs, SOCs, and microbials (Table 3).

There are no significant water chemistry issues affecting the City of Oakley sources. In December 1996, and again in August 1997, total coliform was detected in the distribution system. Chlorodibromomethane, a disinfection byproduct, was detected in the distribution system (July 1998), but no subsequent detections have occurred. Traces of the IOCs fluoride, arsenic, and barium, as well as nitrate in concentrations less than 1.0 milligram/liter (mg/l) have been detected in the water. The maximum contaminant level (MCL) for nitrate set by the Environmental Protection Agency (EPA) is 10 mg/l. While not a concern at this point, the wells and spring exists in a region of high nitrogen fertilizer, high countywide agricultural chemical use, and high county-wide herbicide use.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the sources are currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For the City of Oakley, drinking water protection activities should first focus on maintaining the requirements of the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system’s components and its capacity). Any spills that occur within the delineated area should be carefully monitored, as should any future development. Practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated source water areas should be implemented. No chemicals should be stored or applied within a 50-foot radius of the wellhead or a 100-foot radius of the spring. As most of the designated areas are outside the direct jurisdiction of the City of Oakley, making partnerships with state and local agencies and industry groups are critical to success of drinking water protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineations are near both urban and residential land uses. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil Conservation District, and the Natural Resources Conservation Service.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (e.g. zoning, permitting), or non-regulatory in nature (e.g. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Twin Falls Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR CITY OF OAKLEY, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the rankings of this assessment mean.** Maps showing the delineated source water assessment areas and the inventory of significant potential sources of contamination identified within those areas are attached. The lists of significant potential contaminant source categories and their rankings, used to develop this assessment, are also attached.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the EPA to assess the over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the wells, and aquifer characteristics. All assessments must be completed by May of 2003. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water system is not possible. **This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of this assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho DEQ recognizes that pollution prevention activities generally require less time and money to implement than treating a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The City of Oakley drinking water system (PWS 5160035) consists of two ground water well sources and two manifolded spring sources. Both wells are located approximately 1.5 miles south of the city, and the springs are located approximately 5 miles south of the city. Well #1 was constructed in 1970 and Well #2 was constructed in 1991. No information was available as to the Carpenter Springs' construction date, but some significant improvements were scheduled to begin in the fall of 1999. The system serves approximately 730 people through 340 connections (Figure 1).

There are no significant water chemistry issues affecting the City of Oakley sources. In December 1996, and again in August 1997, total coliform was detected in the distribution system. Chlorodibromomethane, a disinfection byproduct, was detected in the well (July 1998), but no subsequent detections have occurred. Traces of the IOCs fluoride and barium, as well as nitrate in concentrations less than 1.0 mg/l have been detected in the tested water. The MCL for nitrate set by the EPA is 10 mg/l. While not a concern at this point, the wells and springs exist in a region of high nitrogen fertilizer, high county-wide agricultural chemical use, and high county-wide herbicide use.

Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer.

The City of Oakley sources are all located within the Oakley Fan Critical Ground Water Area (CGWA). The northwest trending Foothills Road fault is the approximate western no flow boundary for the Oakley Fan CGWA (Edwards and Young 1984). Pump tests have shown no hydraulic connection between the limestone on the southwest side of the fault and the alluvium, basalt, and rhyolite on the northeast side of the fault (Young and Newton, 1989). The Snake River and the Albion Range represent the northern and southern no flow boundaries, respectively (Crosthwaite, 1969). The northwest trending Churchill Knolls fault to the east interferes with the predominantly north ground water flow direction, shifting the flow to the northwest.

The lithology of the Oakley Fan area consists of undifferentiated pre-tertiary sedimentary rocks, tertiary silicic volcanics, quaternary and tertiary basalt, and quaternary alluvium (Crosthwaite, 1957). These four formations represent the main aquifers in the Oakley Fan area. The immediate area around Oakley is dominated by quaternary alluvium overlying the Idavada Volcanics and a few scattered basalt flows (Crosthwaite, 1969).

The undifferentiated pre-tertiary sedimentary rocks are dominated by limestone and marine deposits and yield large amounts of water. The low hydraulic gradient, lack of altitude control, and wide distribution of wells extracting water from the limestone aquifer prevents accurate contouring of the potentiometric surface. The general movement of groundwater in this confined aquifer is north toward the Foothills Road fault and then northwest (south of the Churchill Knolls fault) and east (north of the Churchill Knolls fault) (Young, 1984). The limestone has a high permeability and a transmissivity ranging from 14,600 ft^2/day to 26,000 ft^2/day (Edwards and Young, 1984). The tertiary silicic volcanics consist of rhyolite and welded ash flows of the Idavada Volcanics. The confined rhyolite aquifer yields small to moderate amounts of water at a rate of 550 to 1,800 gallons per minute (gpm) from voids, fractures, joints, and weathered zones (Young and Newton, 1989). The Idavada Volcanics in the area have a low permeability and a transmissivity ranging from 2,590 ft^2/day to 8,390 ft^2/day (Edwards and Young, 1984). The quaternary and tertiary basalts consist of olivine basalt flows of the Snake River Group. This unconfined aquifer yields small to large quantities of water at a rate of 500 to 2,000 gpm from voids, fractures, joints, and weathered zones. The basalt aquifer contains low and high permeability zones with transmissivity ranging from 1,700 to 3,110,000 ft^2/day (Edwards and Young, 1984). The quaternary alluvium consists of unconsolidated clay, silt, sand, and gravel. This unconfined aquifer yields small to moderate amounts of water in sand and gravel (Young and Newton, 1989). A perched aquifer, the result of surface water loss and percolation of irrigation water, is also present from Oakley extending north approximately 5 miles (Crosthwaite, 1969).

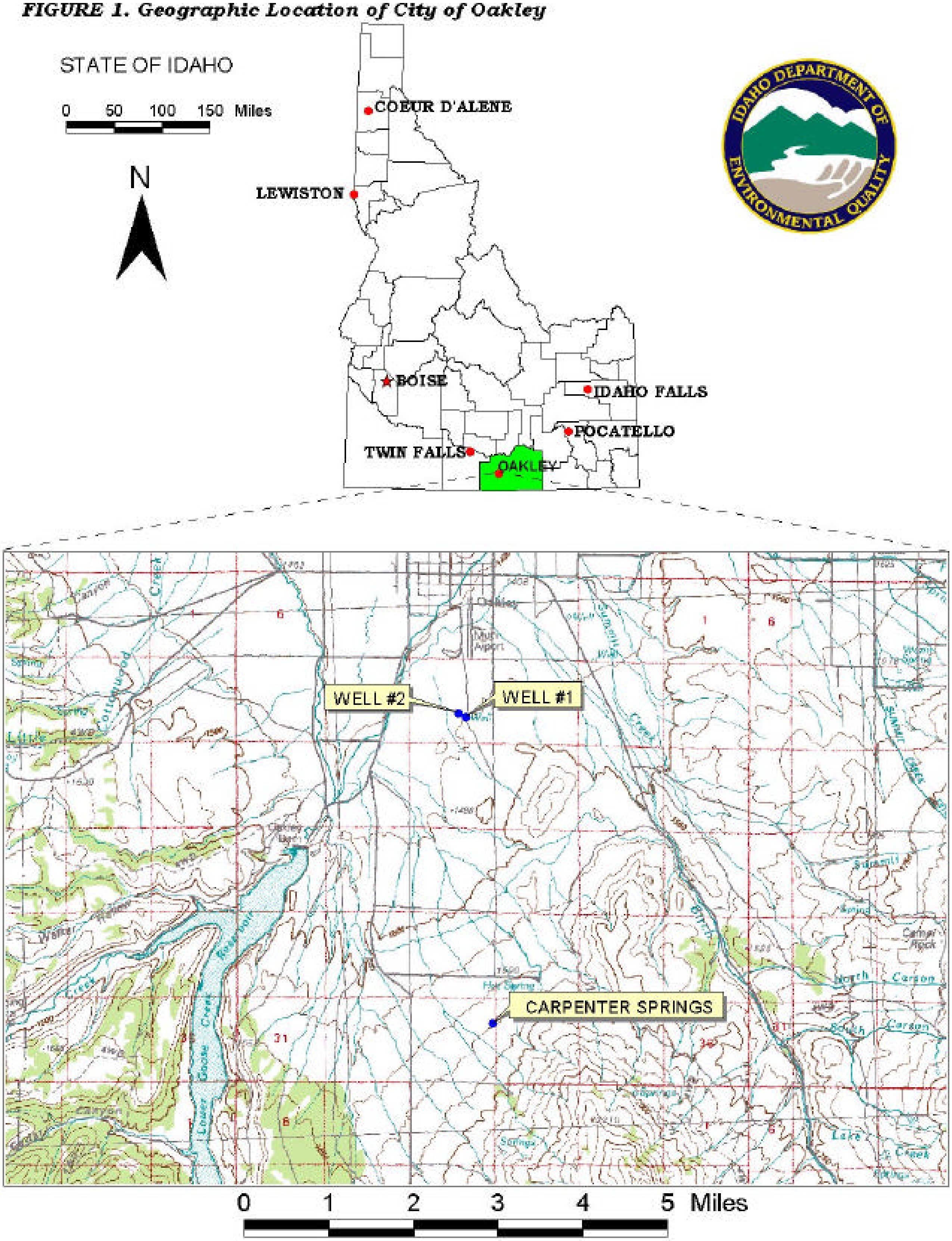
The groundwater flow direction is predominantly to the north (northwest between the faults) in the vicinity of Oakley (Young and Newton, 1989). Much of the surface water in the area is used for agricultural irrigation purposes. Run off in Upper Goose Creek from precipitation is stored in the Goose Creek Reservoir for use in irrigation. Loss from the reservoir results in mounding of the water table in years of relatively high precipitation (Bendixsen, 1994). Water from precipitation on the mountains infiltrates and moves downhill to form seeps and springs or recharge the aquifers (Crosthwaite 1969).

Precipitation on the fan averages 10 inches/yr and 55 inches/yr in the mountains to the south, primarily in the winter (Young and Newton, 1989). Recharge to the aquifers amounts to 2 inches/yr (USGS). Recharge is due to loss from surface water bodies, precipitation, local run off, loss from canals, and percolation of irrigation water (this percolation is observed mainly in the alluvial aquifer in the immediate vicinity of Oakley, not regionally) (Crosthwaite, 1969). The aquifer in the Idavada volcanics is recharged two to four times more rapidly than the limestone aquifer (Edwards and Young, 1984). Observed changes in the water table have averaged 5 ft/yr since 1977 with greatest groundwater elevations observed prior to spring irrigation and the lowest in the summer.

WhAEM model boundary conditions were set according to the reports mentioned above. According to the well logs, the city of Oakley wells terminate in a producing zone composed of rhyolite. Well #1 contains a screened producing zone 25 feet thick, and well #2 contains a screened producing zone approximately 75 feet thick. The North Oakley well also terminates into rhyolite. The bottom 35 feet of this well is screened. Thirty-nine feet of the Marion well is screened in the alluvium (clay and gravel, sandy clay). The well terminates into clay. Modeled K values ranged from 20 – 50 ft/d and modeled thickness values ranged from 25 to 100 ft. Porosity was modeled at 0.3 and 0.2, however, increasing the porosity merely shortened the length, not the breadth of the modeled capture zones. Increasing the thickness narrowed the capture zone and increased the required amount of recharge with little effect on the length. Increasing the K value increased the length of the capture zone, decreased the required amount of recharge and had little effect on the width of the capture zone. The average, maximum, and 350 gpd pumping rates were modeled. Slight differences in the capture zones (longer and wider) were produced using the maximum pumping rate. When Goose Creek reservoir is modeled as a flux, the capture zones are strongly influenced towards the reservoir. The true influence of the reservoir has not been documented, consequently, the delineations were drawn as composites of the average pumping rates with and without the reservoir as a flux.

Very little information was available with respect to the springs. No record of their development is available. Consequently, the springs (watersheds) were delineated using the topographic method. The delineated source water assessment areas for the wells can best be described as a south-trending corridor approximately 5 miles long and 1.5 miles wide (Figure 2), while the spring's delineation is the watershed up-gradient of its collection boxes (Figure 3). The actual data used by DEQ in determining the source water assessment delineation areas is available from DEQ upon request.

FIGURE 1. Geographic Location of City of Oakley



Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ, the City of Oakley, and from available databases.

The dominant land use surrounding the City of Oakley's delineations is undeveloped and rangeland.

It is important to understand that a release may never occur from a potential source of contamination provided best management practices are used at the facility. Many potential sources of contamination are regulated at the federal level, state level, or both, to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, such as educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A contaminant inventory of the study area was conducted in June and July 2002. This involved identifying and documenting potential contaminant sources within the City of Oakley Source Water Assessment Areas through the use of computer databases and Geographic Information System maps developed by DEQ.

The delineation for the City of Oakley wells have 2 listed potential sources (Table 1). The GIS map (Figure 2) shows no transportation corridors existing within the delineation. The gravel pit and unnamed quarry could contribute contaminants to the aquifer if an accident occurred at them.

The delineation for City of Oakley spring has no listed potential contaminant sources (Figure 3).

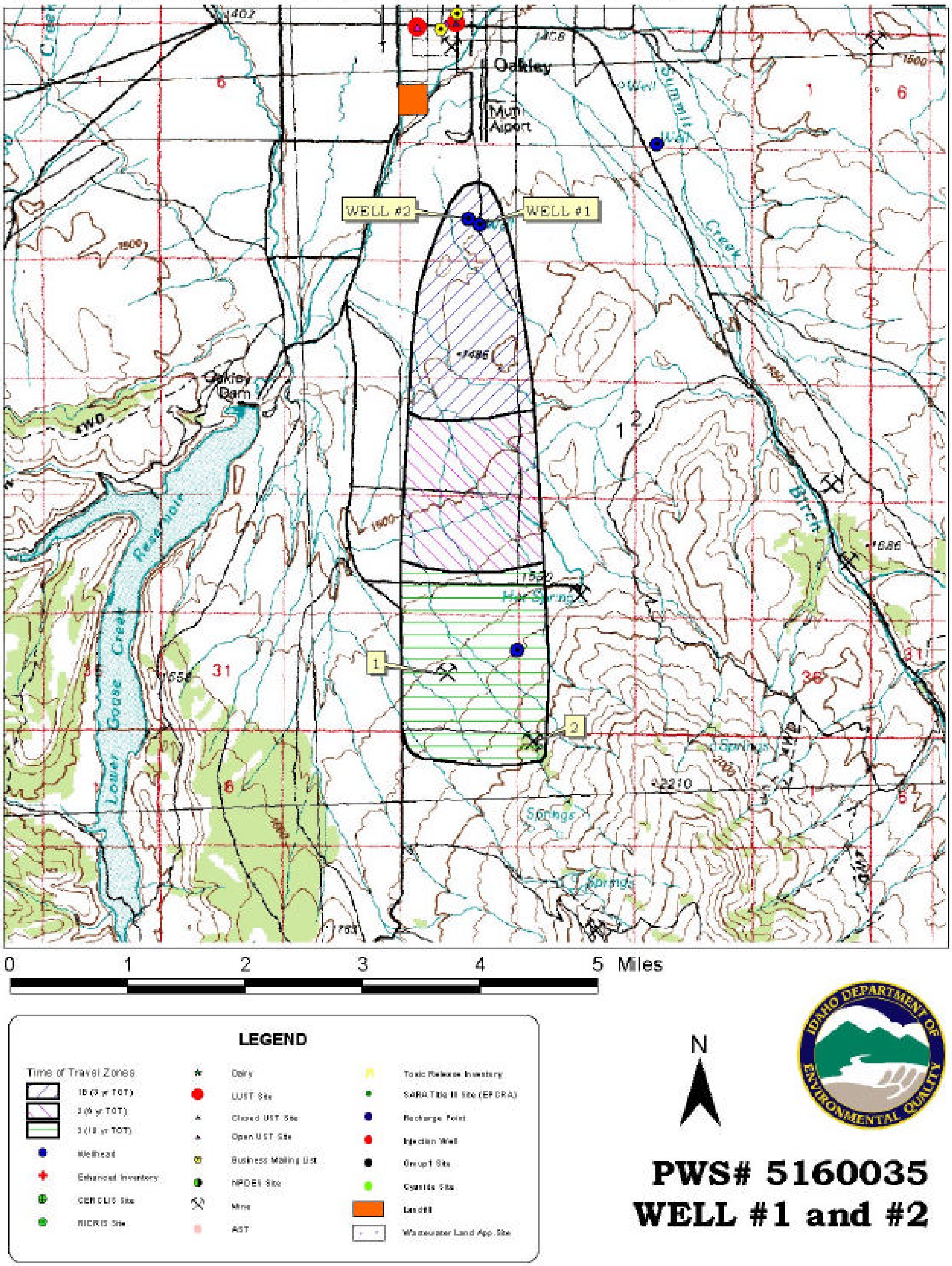
Table 1. Well #1 and Well #2, Potential Contaminant Inventory

SITE	Source Description[1]	TOT[2] ZONE	Source of Information	Potential Contaminants[3]
1	Gravel Pit	0-3 YR	Database Search	IOC, VOC, SOC
2	Unnamed Quarry	0-3 YR	Database Search	IOC, VOC, SOC

[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Figure 2. City of Oakley Delineation Map and Potential Contaminant Source Locations



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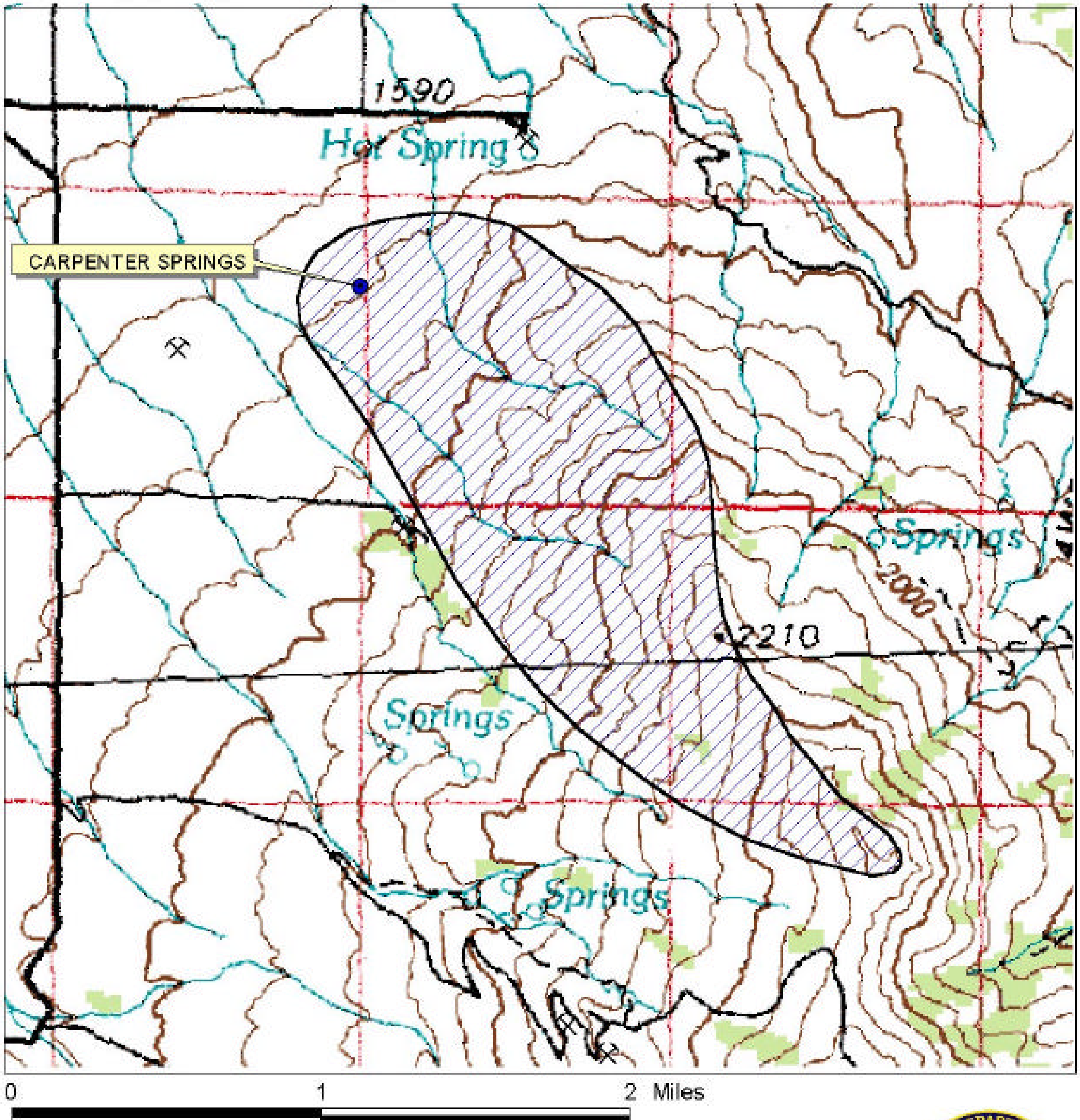

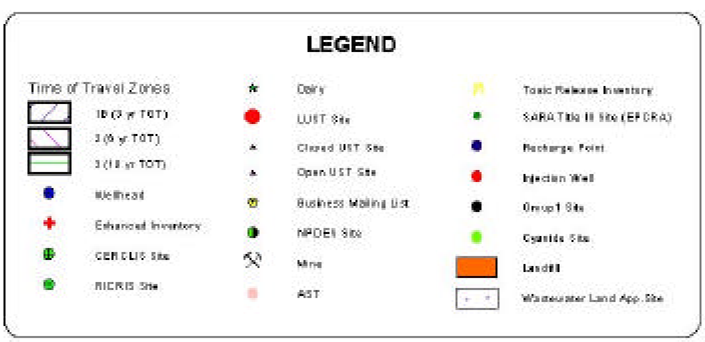

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PWS# 5160035
CARPENTER SPRINGS

Section 3. Susceptibility Analyses

The wells and springs' susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics (wells only), physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Appendix A contains the susceptibility analysis worksheets. The following summaries describe the rationale for the susceptibility ranking.

Well Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone (aquitard) above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

The hydrologic sensitivity was moderate for each well. Positively affecting this rating are water tables of more than 300 feet, vadose zone compositions of fine-grained materials, and aquitards in both wells. Adversely affecting the ratings is the presence of moderately to highly drained soils surrounding the wells and their delineation.

System Construction

Spring Construction

Spring construction directly affects the ability of the intake to protect the aquifer from contaminants. The Idaho Administrative Code for Public Drinking Water Systems (IDAPA 58.01.08.04) states that springs which supply water for a public water system served by one or more springs shall ensure that the following requirements are met:

a. Springs shall be housed in a permanent structure and protected from contamination including the entry of surface water, animals, and dust;

b. A sample tap shall be provided;

c. A flow meter or other flow measuring device shall be provided; and

d. The entire area within one hundred (100) feet of the spring shall be owned by the supplier of water or controlled by a long term lease, fenced to prevent trespass of livestock and void of buildings, dwellings and sources of contamination. Surface water and drainage ditches shall be diverted from this area.

With regard to this report, spring construction was evaluated by answering two questions created out of rule “a” and “d” above: 1. Is the spring’s intake structure, infiltration gallery, housing, and protective fence located and constructed in such a manner as to satisfy Idaho Code? 2. Was the water collected in such a manner that it is not exposed to any surface related contaminants (atmospheric air, dust, precipitation runoff, animals, etc.)?

The Carpenter Springs rated high for system construction. Renovation of the infiltration galleries, collection boxes, and piping of the spring was due to begin in the fall of 1999. No data was available regarding the work’s completion so this report assumed the conservative stance of non-completion. The sanitary survey makes no mention of a fence surrounding the spring, or other protective efforts around the spring. Although the sanitary survey noted the water system was in “substantial compliance” with regulations, because improvements were planned, it is assumed that the spring did not meet current standards completely.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in Sanitary Surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced.

Well #1 rated high for system construction. The well is located outside of the 100 year floodplain. However, the well log indicated that neither the casing, nor the annular seal were seated into units of permeability, nor was the well’s highest production originating from more than 100 feet below static water levels. The 1999 Sanitary Survey noted that the casing needed to be raised higher above ground. In addition, the Sanitary Survey noted the absence of a sample tap, pressure gauge, check valve, and isolation valve (Table 2).

Well #2 rated moderate for system construction. The well is not in a 100 year floodplain, and based on the well log, its highest production comes from more than 100 feet below static water levels, and the casings and annular seal extend into low permeability units. The 1999 Sanitary Survey did not contain any information about Well #2, so it is unknown if the wellhead and surface seal are maintained to current standards (Table 2).

The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all Public Water Systems (PWSs) to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. Some of the requirements include casing thickness, well tests, and depth and formation type that the surface seal must be installed into. Table 1 of the *Recommended Standards for Water Works* (1997) lists the required steel casing thickness for various diameter wells. Ten-inch diameter wells require a casing thickness of 0.365 inches and fourteen-inch diameter wells require a casing thickness of at least 0.375 inches. Well tests are required at the design pumping rate for 24 hours or until stabilized drawdown has continued for at least six hours when pumping at 1.5 times the design pumping rate. A point was added to each well's score because they do not meet all current construction standards. Though the wells may have met standards at their time of construction, current construction standards are stricter.

Potential Contaminant Source and Land Use

Well #1 and Well #2 rated low for IOCs (e.g. arsenic, nitrate), VOCs (e.g. petroleum products), SOCs (e.g. pesticides), and microbial contaminants (e.g. bacteria). The gravel pit and unnamed quarry contributed to the rating. In addition, due to it's volume in the Cassia county, agricultural related chemicals were counted as a source for IOCs and SOCs (Table 2).

Carpenter Springs rated low for IOCs, VOCs, SOCs, and microbial contaminants. Generally, there are no potential contaminant sources within the delineation. The high county wide agricultural chemical use was counted as the only potential contaminant source.

Final Susceptibility Rating

An IOC detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well, despite the land use of the area, because a pathway for contamination already exists. Additionally, the storage or application of any potential contaminants within 50 feet of the wellhead will automatically lead to a high score. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0- to 3-year time-of-travel zone (Zone 1B) and much agricultural land use contribute greatly to the overall ranking. In terms of total susceptibility, the City of Oakley wells have moderate susceptibility to the IOC, VOC, SOC, and microbial potential contaminants.

Table 2. Summary of the City of Oakley, Well Susceptibility Evaluation

Source	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	**Final Susceptibility Ranking**			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	M	L	L	L	L	H	M	M	M	M
Well #2	M	L	L	L	L	M	L	L	L	L

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 3. Summary of City of Oakley, Springs' Susceptibility Evaluation

Sources	Susceptibility Scores[1]								
	Contaminant Inventory				System Construction	Final Susceptibility Ranking			
	IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Carpenter Springs	L	L	L	L	H	L	L	L	L

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Susceptibility Summary

The City of Oakley drinking water system consists of two ground water well sources and two spring sources. Both wells are located approximately 1.5 miles south of the city, and the springs are located approximately 5 miles south of the city. Well #1 was constructed in 1970 and Well #2 was constructed in 1991. No information was available as to the Carpenter Springs' construction date, but some significant improvements were scheduled to begin in the fall of 1999. The system serves approximately 730 people through 340 connections.
In terms of overall susceptibility, Well #1 rated moderate for IOCs, VOCs, and SOCs, and microbials. Hydrologic sensitivity rated high and system construction rated moderate for the well. Land use scores in the well were low for IOCs, VOCs, SOCs, and microbials (Table 2).

In terms of overall susceptibility, Well #2 rated low for IOCs, VOCs, and SOCs, and microbials. Hydrologic sensitivity and system construction rated moderate for the well. Land use scores in the well were low for IOCs, VOCs, SOCs, and microbials (Table 2).

In terms of overall susceptibility, Carpenter Springs' rated low for IOCs, VOCs, SOCs, and microbials. The springs rated high for system construction and land use scores were low for IOCs, VOCs, SOCs, and microbials.

Section 4. Options for Drinking Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective source water protection program is tailored to the particular local source water protection area. A community with a fully developed source water protection program will incorporate many strategies, be they regulatory in nature (e.g. zoning, permitting) or non-regulatory in nature (e.g. good housekeeping, public education, specific best management practices). For the City of Oakley, drinking water protection activities should first focus on maintaining the requirements of the sanitary survey. Any spills from potential contaminant sources should be carefully monitored, as should any future development in the delineated areas. Although not a problem at this time, practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated source water areas should be implemented. No chemicals should be stored or applied within the 50-foot radius of the wellhead or 100 foot radius of the springs. Most of the designated areas are outside the direct jurisdiction of City of Oakley, making partnerships with state and local agencies and industry groups critical to success of drinking water protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineations are near to urban and residential land uses. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the U.S. Environmental Protection Agency. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil Conservation District, and the Natural Resources Conservation Service.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (e.g. zoning, permitting) or non-regulatory in nature (e.g. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Twin Falls Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

Assistance

Public water suppliers and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Twin Falls Regional DEQ Office	(208) 736-2190
State DEQ Office	(208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Melinda Harper, mlharper@idahoruralwater.com Idaho Rural Water Association, at 1-208-343-7001 for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

<u>AST (Aboveground Storage Tanks)</u> – Sites with aboveground storage tanks.

<u>Business Mailing List</u> – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

<u>CERCLIS</u> – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund≅ is designed to clean up hazardous waste sites that are on the national priority list (NPL).

<u>Cyanide Site</u> – DEQ permitted and known historical sites/facilities using cyanide.

<u>Dairy</u> – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

<u>Deep Injection Well</u> – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

<u>Enhanced Inventory</u> – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

<u>Floodplain</u> – This is a coverage of the 100year floodplains.

<u>Group 1 Sites</u> – These are sites that show elevated levels of contaminants and are not within the priority one areas.

<u>Inorganic Priority Area</u> – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

<u>Landfill</u> – Areas of open and closed municipal and non-municipal landfills.

<u>LUST (Leaking Underground Storage Tank)</u> – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

<u>Mines and Quarries</u> – Mines and quarries permitted through the Idaho Department of Lands.

<u>Nitrate Priority Area</u> – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

<u>NPDES (National Pollutant Discharge Elimination System)</u> – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

<u>Organic Priority Areas</u> – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

<u>Recharge Point</u> – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **<u>Resource Conservation Recovery Act (RCRA)</u>**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

<u>SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities)</u> – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

<u>Toxic Release Inventory (TRI)</u> – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

<u>UST (Underground Storage Tank)</u> – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

<u>Wastewater Land Applications Sites</u> – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

<u>Wellheads</u> – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

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Appendix A

City of Oakley Susceptibility Analysis Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

WELL:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

SPRINGS

1. VOC/SOC/IOC/microbial Final Score = System Construction + (Potential Contaminant/Land Use x 1.125)

Final Susceptibility Scoring:

0 - 6 Low Susceptibility

7 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report Public Water System Name : OAKLEY CITY OF Well# : WELL #1

Public Water System Number 5160035 08/08/2002 1:21:46 PM

1. System Construction		SCORE			
Drill Date	01/10/1970				
Driller Log Available	YES				
Sanitary Survey (if yes, indicate date of last survey)	YES	1999			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	NO	1			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	NO	1			
Well located outside the 100 year flood plain	YES	0			
Total System Construction Score		5			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	NO	0			
Depth to first water > 300 feet	YES	0			
Aquitard present with > 50 feet cumulative thickness	YES	0			
Total Hydrologic Score		2			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	RANGELAND, WOODLAND, BASALT	0	0	0	0
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	0	2	0
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	NO	0	0	0	0
(Score = # Sources X 2) 8 Points Maximum		0	0	0	0
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
4 Points Maximum		0	0	0	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		0	0	0	0
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		0	0	0	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		1	1	1	0
Cumulative Potential Contaminant / Land Use Score		3	1	3	0
4. Final Susceptibility Source Score		8	7	8	7
5. Final Well Ranking		Moderate	Moderate	Moderate	Moderate

1. System Construction		SCORE			
Drill Date	08/27/1991				
Driller Log Available	YES				
Sanitary Survey (if yes, indicate date of last survey)	YES	1999			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	NO	1			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	YES	0			
Well located outside the 100 year flood plain	YES	0			
	Total System Construction Score	4			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	NO	0			
Depth to first water > 300 feet	YES	0			
Aquitard present with > 50 feet cumulative thickness	YES	0			
	Total Hydrologic Score	2			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	RANGELAND, WOODLAND, BASALT	0	0	0	0
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		2	0	2	0
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	NO	0	0	0	0
(Score = # Sources X 2) 8 Points Maximum		0	0	0	0
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
4 Points Maximum		0	0	0	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		0	0	0	0
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		0	0	0	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		1	1	1	0
Cumulative Potential Contaminant / Land Use Score		3	1	3	0
4. Final Susceptibility Source Score		7	6	7	6
5. Final Well Ranking		Moderate	Moderate	Moderate	Moderate

Surface Water Susceptibility Report   Public Water System Name : OAKLEY CITY OF   Well# : CARPENTER SPRINGS

Public Water System Number 5160035   08/08/2002 1:31:07 PM

1. System Construction		SCORE
Intake structure properly constructed	NO	1
Spring water enters distribution system without any contact with air/water/animal potential contaminants	NO	2
Total System Construction Score		3

2. Potential Contaminant Source / Land Use		IOC Score	VOC Score	SOC Score	Microbial Score
Predominant land use type (land use or cover)	BASALT FLOW, UNDEVELOPED, OTHER	0	0	0	0
Farm chemical use high	YES	2	0	2	
Significant contaminant sources *	NO				
Sources of class II or III contaminants or microbials		0	0	0	0
Agricultural lands within 500 feet	NO	0	0	0	0
Three or more contaminant sources	NO	0	0	0	0
Sources of turbidity in the watershed	NO	0	0	0	0
Total Potential Contaminant Source / Land Use Score		2	0	2	0
3. Final Susceptibility Source Score		5	3	5	3
4. Final Sourcel Ranking		Low	Low	Low	Low

* Special consideration due to significant contaminant sources
The source water has no special susceptibility concerns